Fishery Leaflet
#578

UNITED STATES DEPARTMENT OF THE INTERIOR
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Fishery Leaflet 578

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HADDOCK

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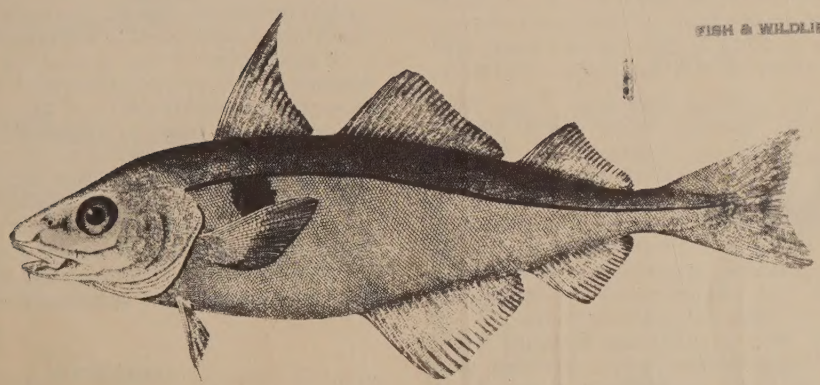

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INTRODUCTION

The haddock (Melanogrammus aeglefinus) is a member of the cod family which includes also the pollock and the hakes. The black lateral line and black shoulder blotch, called the "Devil's thumb print" or "St. Peter's mark," distinguish the haddock from the cod and the pollock, its closest relatives. It is a streamlined fish, dark purplish gray on the top and sides down to the black lateral line, and silvery gray toned with pale pink below.

Haddock are found in the waters of the Northwest Atlantic Ocean and off the coasts of northern Europe, the British Isles, and Iceland. In North American waters haddock are found off Newfoundland and Nova Scotia, in the Gulf of Maine, and on Georges Banks.

In 1963 over 106 million pounds of haddock, worth nearly $12 million to the fishermen, were landed at New England ports. Nearly 80 percent of the catch was landed at Boston, home port of a fleet of large oceangoing trawlers.

HABITS

Haddock are bottom-dwelling fish. Most North American haddock are found on offshore fishing banks in water 150 to 450 feet deep, but they have been caught as deep as 720 feet north of the British Isles, and in 984 feet off Iceland. Haddock are found mostly in areas where the ocean floor consists of hard, smooth sand, pebbles, gravel, or broken shells. They usually are abundant where found, but probably do not form compact schools.

Haddock do not make long-distance mass migrations. Tagging and other studies have shown there is some movement, generally of a seasonal nature between deeper and shoaler waters. The seasonal movements presumably are a search for favorable spawning, feeding, or temperature conditions.

The adults feed mostly on slow-moving, small animals found on or burrowing in the upper layers of the ocean floor. Food items differ according to type of bottom, but generally consist of crabs, shrimps, clams, snails, worms, starfish, sea urchins, sand dollars, and sea cucumbers. Haddock sometimes gorge themselves on burrowing worms that they grub out of the bottom with their muscular lips. The haddock mouth is well suited to this type of feeding, and they have been called the "carp of the sea" because of their habit of rooting on the bottom for food. They eat squid and occasionally feed on fish, mostly sand launce, but, in general, fishes form only a small part of their diet.

In New England waters haddock spawn from February to May, with the peak of spawning in March and April. A single female, depending on size, may produce from 150 thousand to 2 million eggs, each about 1/16 inch in diameter. The haddock spawn their eggs near the bottom. After they are fertilized, the eggs rise and float on the surface of the sea, drifting with the current. An egg hatches in about 14 days, and the newly hatched haddock, which is about 3/16 inch long, continues to drift with the current. At this stage in its development, it is nourished by a yolk sac attached to its belly. The yolk is absorbed in about 10 days, after which the little haddock feed on zooplankton--small feebly swimming animals (fig. 1).

Although each haddock produces many eggs, few of the eggs survive to become adult fish. Some eggs are eaten by other fishes, and many may be carried by currents off the banks and out over the great depths of the sea. Young haddock from such eggs die when they attempt to swim to the bottom. Many small haddock are eaten by larger haddock, silver hake, pollock, cod, white hake, and skates.

During summer, young haddock up to 3 inches long are often found living under the red jellyfish (Cyanea). Biologists think the fish seek the jellyfish as a refuge from enemies.

When about 4 to 5 months old and 3 to 4 inches long, the young haddock begin to descend through the mid-depths of the sea to the ocean floor, where they will spend the rest of their lives. There is little information on the activities of the young haddock in the mid-depths; however, it is believed the process is not a rapid dive to the bottom, but is more like a gradual swimming downward which may take 1 to 2 months. Presumably they continue to feed on zooplankton during this period.

GROWTH

When the haddock reach the bottom (usually sometime in September to October), they are about 5-1/2 inches long. The first 3 years on the bottom is a period of rapid growth; on Georges Banks, 1-year-old haddock average 7-1/2 inches in length, 2-year-old haddock 12-1/4 inches, and 3-year-old haddock 17 inches. Figure 2 shows the growth rate of haddock from Georges Bank, for fish up to 9 years of age. After the third year, haddock grow more slowly and, although a few fish live to be 15 years old, they rarely are longer than 34 to 36 inches. The largest haddock on record was an Icelandic fish 44 inches long which weighed 37 pounds.

AGE DETERMINATION

The age of a haddock, as with many other species of fish, can be determined by examining its scales under the microscope. Figure 3 is a photograph of a haddock scale showing the features used to determine the age. The

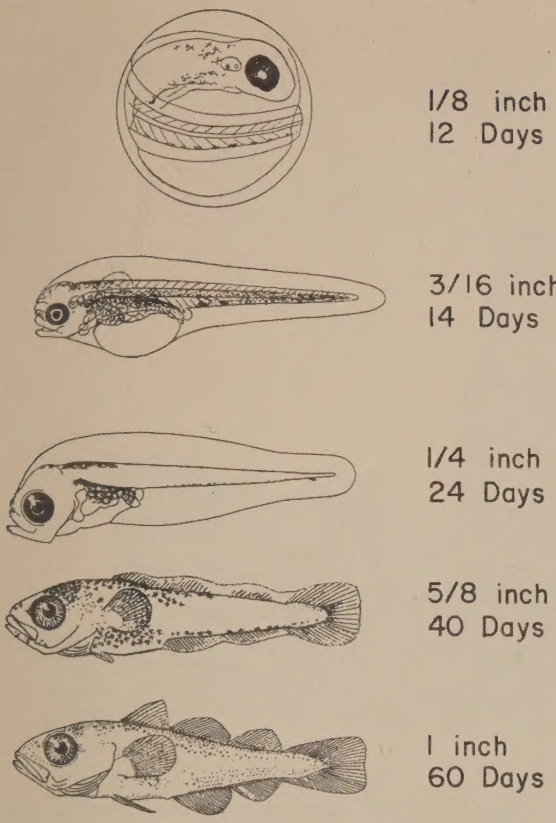

Figure 1.--Early life stages of the haddock showing (top to bottom), the egg, development of the larva, and the young fry. The size and age (days from spawning) for each stage are given.

scale is composed of a horny material formed in a series of roughly concentric rings. Widely spaced rings form in summer and early fall when ocean waters are warmest and the fish is growing rapidly. Narrowly spaced rings form in cold months when the fish is growing slowly. One year's growth appears on the scale as a series of wide rings (light band) followed by a series of narrow rings (dark band). The number of zones of narrow rings shows the number of winters through which the fish lived and, thus, indicates the age of the fish. Annual marks are also formed on earstones (known as otoliths) found within the skull, on finrays, and on some of the bones.

COMMERCIAL FISHERY

The commercial fishery for haddock is carried out by a large fleet of vessels, mostly otter trawlers. They range in size from small wooden draggers, 40 to 50 feet long, up to oceangoing steel trawlers 125 feet or larger (fig. 4). These boats drag an otter trawl (fig. 5), basically a large flattened cone of rope netting, over the ocean floor on known haddock grounds. Small numbers of haddock are also caught by gill nets, fish traps, and longlines.

A gill net is simply a wall of netting kept vertical in the water with plastic floats at the top and lead sinkers at the bottom. In New England waters gill nets are fished on the ocean bottom in depths of 120 to 240 feet. The nets are 6 feet high and may be up to 2 miles long. Fish swimming into the 6-inch mesh can pass only part way through. The twine slips over the gill covers and the fish then can go neither forward nor backward. Gill nets are set one day and the fish removed the next day.

Fish traps, or pound nets, consist of a netting enclosure with a straight wall (the leader) that extends shoreward. Fish swimming along the shore are turned toward and into the enclosure by the leader. The traps may be set in water 80 feet deep with leaders up to a mile long. Weather permitting, they are tended daily and the fish removed at each visit.

Longlines, also called line trawls, are sets of lines, each several hundred feet long to which are fastened baited hooks spaced 6 feet apart. The lines are set out to rest on the bottom and remain in place for one to several hours after

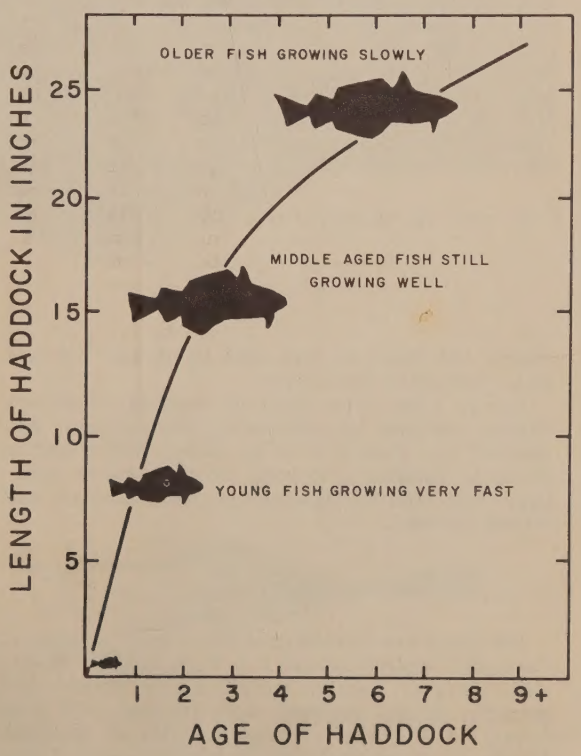

Figure 2.--Haddock grow rapidly until they are about 5 years old and then their rate of growth begins to slow down.

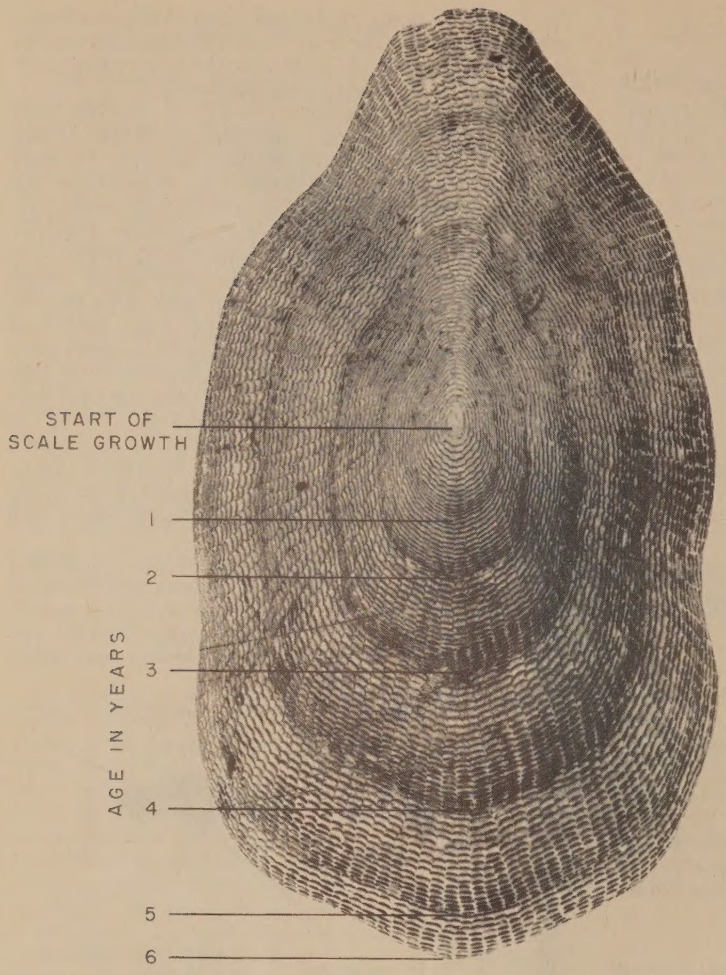

Figure 3.--Photograph of a scale from a 6-year-old haddock. The zone of winter rings, marking the end of one year's growth, are counted to determine the age of the fish.

which the lines are hauled back and the fish removed from the hooks.

In the 1963 New England landings, haddock ranked second in volume and value, being exceeded in volume only by ocean perch and in value by lobsters. Boston led in haddock landings, followed by Gloucester, New Bedford, and Provincetown.

UTILIZATION

Haddock are landed in two market categories: "scrod," which weigh 1-1/2 to 2-1/2 pounds, and "large," which weigh more than 2-1/2 pounds. Most haddock are filleted and sold fresh or frozen. A large volume of haddock fillets are frozen in blocks and processed into fish sticks. The development of precooked, breaded fish sticks as a quick and easy way to serve haddock has increased the consumption of this species in American homes.

RESEARCH

Research in haddock biology in recent years has been concerned mostly with gaining an understanding of the haddock populations on Georges Bank and the waters off New England. One area of research is a study of the early life history of the fish from the time the eggs are spawned until the young fish first go to the bottom. Biologists believe fluctuations in haddock abundance are not the results of fluctuations in the production of eggs, but in the number of larvae that survive to reach the bottom.

Identifying haddock stocks is another area of research. Are the haddock of Georges and Browns Banks and the Gulf of Maine all the same fish stock? Do they move at will from one bank to another? Or, are the haddock on the several banks separate stocks, each staying pretty much on their own grounds? Tagging studies help find answers to these questions.

Figure 4.--A typical large otter trawler, mainstay of the Boston haddock fleet. Vessels such as this travel 150 to 200 miles out to sea to catch haddock.

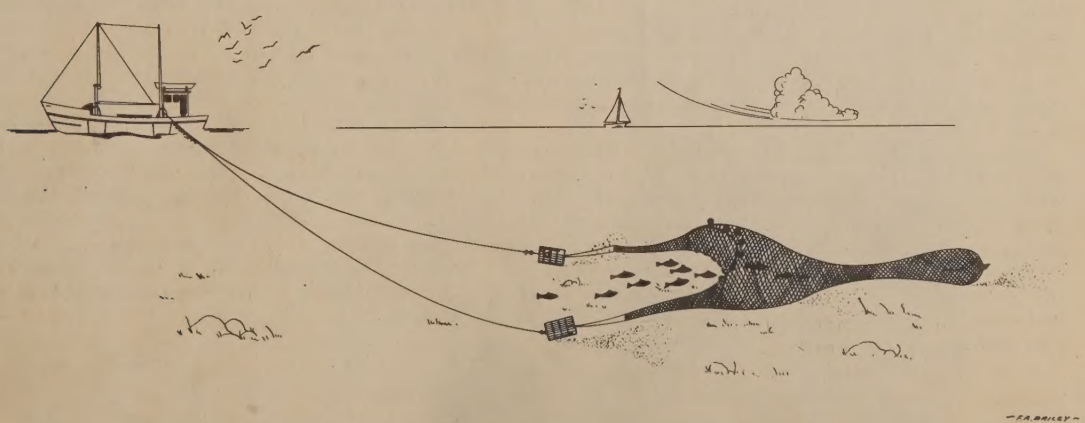

Figure 5.--The otter trawl is dragged over the ocean floor to capture haddock.

Working aboard Bureau of Commercial Fisheries research vessels and chartered fishing vessels, biologists have tagged nearly 10,000 haddock. The most commonly used tag has been the Petersen tag, which consists of two thin plastic disks, bearing a serial number and reward message, attached to the gill covers of the fish with a stainless steel pin. This tag is being replaced by the more visible "spaghetti" tag made of bright yellow vinyl plastic tubing on which is printed a message and a serial number. The spaghetti tag is attached through the fish's back muscles. It is harmless to the fish and promises to be useful for studying their movements and migrations. To date, more than a thousand tagged haddock have been recaptured by commercial fishermen. Most were recaptured in the same general areas where they were released, but a few individuals traveled up to 200 miles.

Haddock ecology is another area of investigation. Ecological studies seek to learn the relation between the haddock and its environment, both biological and physical. The environment includes other animals--prey, predators, competitors, and associates--found living with the haddock. Environment also includes the water--its depth, temperature, and salinity--and the nature of the bottom where haddock live. Such studies will help answer the questions why haddock are found in one place and not in another, and what fishes are food competitors.

All the factors affecting haddock abundance, including man's depredations, are brought together in studies called population dynamics. These studies seek to help commercial fishermen obtain the maximum sustained catch. The number of haddock on the banks and the size at which the fish are first caught are important factors in population dynamics.

Studies on the haddock resulted in a conservation measure designed to protect the young fish, not yet of marketable size. In 1952, a regulation put a ban on the use of trawl nets with a mesh smaller than 4-1/2 inches. This mesh size retains the marketable scrod and large haddock, but allows the smaller haddock to escape and grow to larger sizes.

The mesh regulation is part of the program of the International Commission for the Northwest Atlantic Fisheries (ICNAF), whose members include the United States, Canada, and 11 European nations. All the members fish in the Northwest Atlantic Ocean and have agreed to the principles of conservation of fishes in these waters. Some of the members, including Canada and Russia, fish on Georges Bank.

Each year the members of ICNAF report their catches. To date there is no indication that any nation other than the United States is fishing specifically for haddock in the international waters off the coast of the United States; however, small quantities are caught by other nations incidentally with catches of herring and silver hake. The United States is by far the heaviest harvester of the haddock resource in the Georges Bank-Gulf of Maine waters.

Studies of the haddock populations are made by periodic survey cruises with Bureau research vessels. In recent years the addition of a new vessel, Albatross IV (fig. 6), has made it possible to expand the area surveyed. The vessel's unique and efficient stern-trawler design and its modern laboratories enable scientists to study a wider area of the sea than before and extract more information from the biological collections.

Each year the Albatross IV makes three survey cruises, in the spring (March-April), summer (July), and autumn (October-November). Information gathered during the cruises enables the biologists to make more accurate predictions of the relative size of a particular brood or year class of haddock. The strength of the year class determines the abundance of haddock in commercial catches in later years. Some year classes are stronger than others, and this leads to fluctuations in the commercial catch. For example, the 1956 and 1957 year classes were weak and haddock catches were low in 1958 and 1959. In contrast, the 1958 and 1959 year classes were stronger and haddock catches were higher in 1960 and 1961. Present indications are that the 1963 year class is a strong one; so, catches should be good in 1965.

Haddock studies, as with other fishery research, cannot solve all the problems. The solving of one problem soon reveals new and challenging problems that require answers. But the basic goal of all fishery research is to ensure wise use of a renewable resource.

If you want to know more about haddock, read Fishes of the Gulf of Maine (pages 199-213) by Bigelow and Schroeder, published in 1953 as Volume 53 of the Fishery Bulletin of the U.S. Fish and Wildlife Service. Your local library may have this book; if not, the librarian can borrow it for you. The volume contains information on more than 200 species of fishes from the Northwest Atlantic Ocean and is recommended to anyone interested in the study of fishes.

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Revision of Fishery Leaflet 489, dated March 1960.

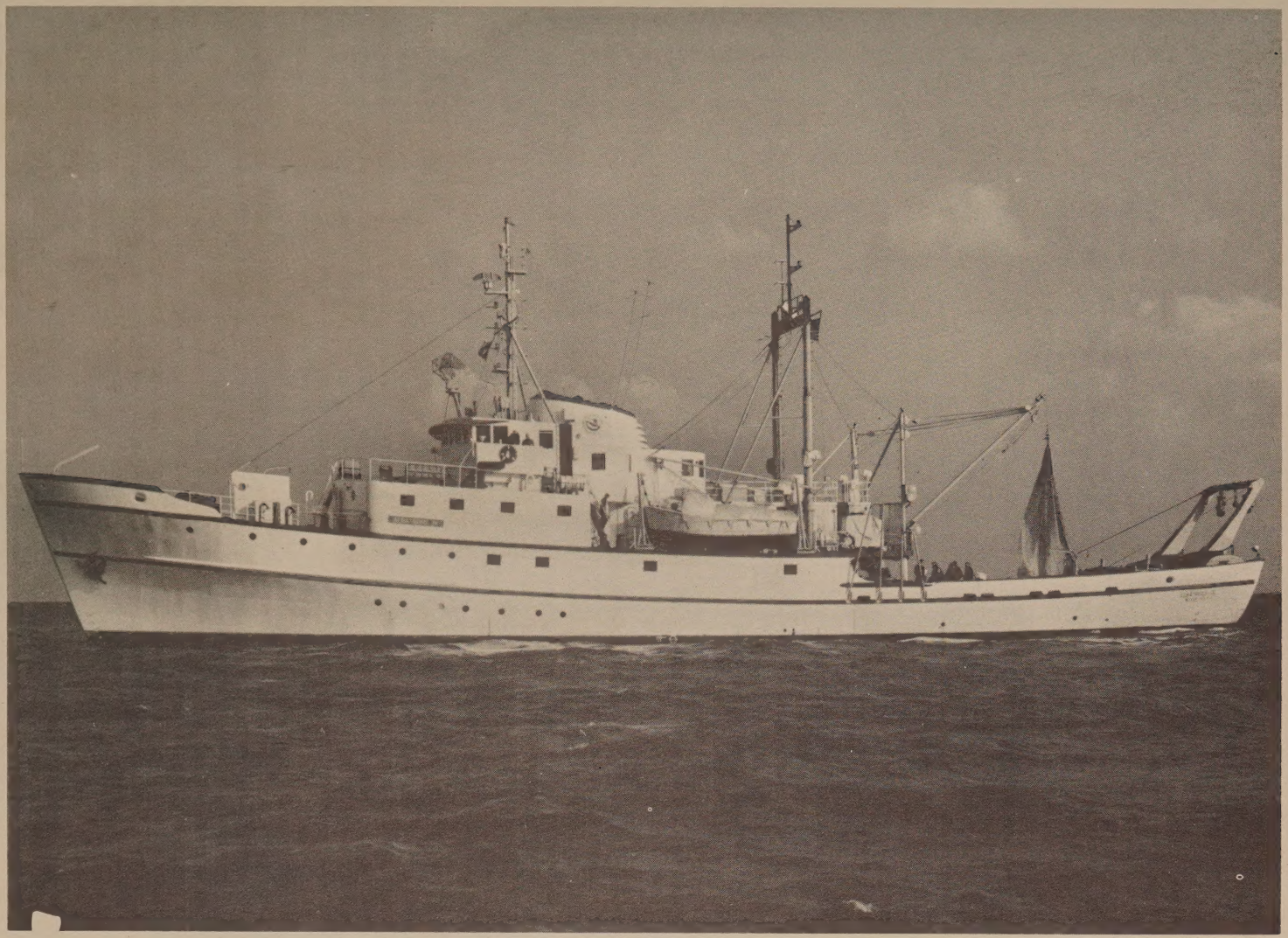

Figure 6.--Albatross IV, one of the newest of the Bureau's oceangoing research vessels, is based at Woods Hole, Mass. Commissioned in 1963, she is 180 feet long.

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Created in 1849 the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.

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